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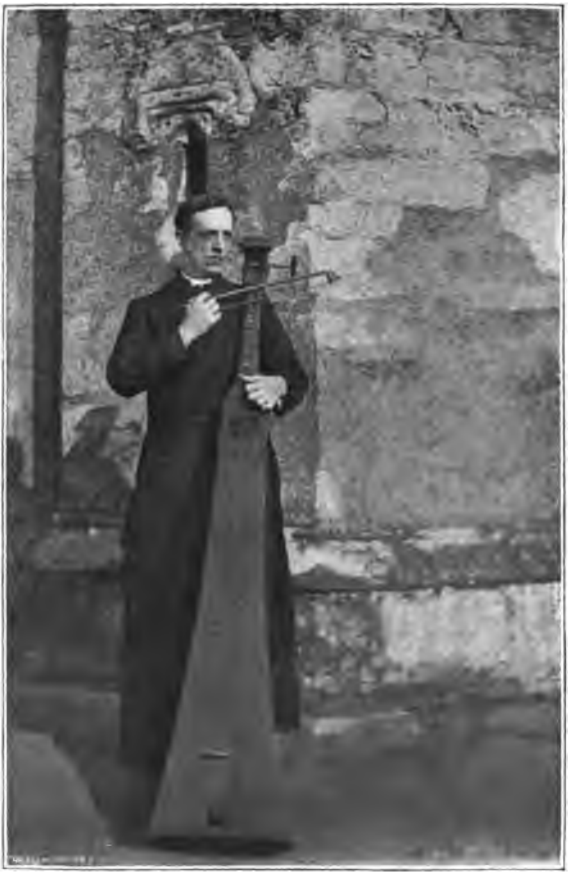

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Contents.

PAGE
Introduction 1
The Flute Family 8
The Oboe Family 16
The Clarinet Family 23
The Bagpipe Family 28
The Horn Family 33
The Cornetto or Ophicleide Family ... 38
The Violin Family 44
The Lute Family 57
The Harp Family 63
The Harpsichord Family 70
The Piano Family 82
The Organ Family 96

228

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ILLUSTRATIONS.

PLATE I.—THE FLUTE FAMILY.

1. NAY (a. 18 inches long, b. 29 inches), Egyptian.
2. PIPE and TABOR, English, 18th century.
3. FLAGEOLET, by Tibouville, French, 18th century.
4a. RECORDER (ivory), in G, German, c. 1700.
4b. RECORDER, in F, by Stanesby, London, c. 1730.
4c. RECORDER (Tenor), in B flat, by Stanesby Junior, London, c. 1740.
4d. RECORDER (Bass), in F, German, c. 1700.
5. FLAGEOLET or BIRD PIPE, English, c. 1800.
6. DOUBLE FLAGEOLET, by Simpson, London, c. 1820.
7. FANGO-FANGO or NOSE FLUTE, Fijian.
8a. FLUTE (ivory), in D, French, c. 1730.
8b. FLUTE (Alto), in A, by W. H. Potter, London, 18th century.
8c. FLUTE (Tenor), in F, by Wigley and Macgregor, London, 1810.
8d. FLUTE (Bass), in D, by Wigley and Macgregor, London, 1810.

PLATE II.—THE OBOE FAMILY.

1. AULOS or TIBIA, Greek.
2. ZAMR (length, including reed, 24 inches), Persian.
3. SCHALMEY, German. The old English SHAWM.
4. HOBOY or WAIGHT, English, c. 1680.
5a. OBOE, in C, by Fornari, Venice, 18th century.
5b. OBOE (D'amore), in A, by Bizey, French, c. 1730.

5c. **OBOE** (Tenor), in F, by Milhouse, of Newark, 18th century.
5d. **OBOE** (Basset), in C, English, c. 1720.
6a. **OBOE DA CACCIA** or **COR ANGLAIS** (curved form), by Fornari, Venice, 18th century.
6b. **OBOE DA CACCIA** or **COR ANGLAIS** (angular form), by Kuss, Vienna, c. 1810.
7a. **DULCIAN**, by J. C. Denner (the inventor of the Clarinet), Nuremberg, c. 1690.
7b. **TENOROON**, in F, by Stanesby (?), English, c. 1740.
7c. **BASSOON**, by Stanesby Junior, London, 1747.
7d. **DOUBLE BASSOON** (length, 78 inches), by Stehle, Vienna, c. 1820.

PLATE III.—THE CLARINET FAMILY.

1. **ARGHOUL** (length of long pipe 48 inches), Egyptian.
2. **ZUMMARAH**, Egyptian.
3. **PIBGORN** or **HORNPIPE**, used from 16th—18th century.
4. **CHALUMEAU**, 16th—18th century.
5. **REED HORN**, South American.
6. **BASSET HORN**, in F, by Grenser, Dresden, early 19th century.
7a. **CLARINET**, in E flat, by Goulding, London, 18th century.
7b. **CLARINET**, in B flat, by Bland, London, 18th century.
7c. **CLARINET** (Tenor), in F, by Key, London, early 19th century.
7d. **CLARINET** (Bass), in B flat, English, c. 1850.

PLATE IV.—THE BAGPIPE FAMILY.

1. **PASTORAL PIPE** (ivory), with cap, Irish, 18th century.
2. **KRUMHORN** or **CROMORNE**, 15th—17th century.
3. **RACKETT** or **CERVELAS**, 16th and 17th centuries.
4. **CORNAMUSE** (length of longest drone 48 inches), Italian, 18th century.

5. **GREAT HIGHLAND PIPES**, Scotch, c. 1800.
6. **NORTHUMBRIAN PIPES** with bellows, English, early 19th century.
7. **UNION PIPES** with bellows, Irish, c. 1800.

PLATE V.—THE HORN FAMILY.

1. **WAR HORN** (elephant ivory), African.
2. **RAM'S HORN TRUMPET** (**SHOFAR**), Jewish.
3. **HERALD'S TRUMPET** (**TUBA**), by Sebastian Hainlein, German, 1460.
4. **CLARION** (**CLARINO**), by J. W. Haas, Nuremberg, c. 1650.
5. **HAND TRUMPET**, by Lintner, Augsbourg, 1786.
6. **SLIDE TRUMPET**, English, c. 1810.
7. **SACKBUT** or **TROMBONE** (treble), by Schmied, of Pfaffendorf, 1781.
8. **BUCCINA**, as used by the Roman Infantry; length of cross-bar 52 inches.
9. **ALPHORN** (length 10ft.), by Almen, of Lauterbrunnen, Swiss, 19th century.
10a. **HUNTING HORN**, by Friedrich Ehe, Nuremberg, c. 1650.
10b. **HUNTING HORN**, by William Bull, London, 1699.
11. **HAND HORN**, English, 18th century.

PLATE VI.—THE CORNETTO (OPHICLEIDE) FAMILY.

1. **CONCH** or **SHELL TRUMPET** (with one lateral hole), South Sea Islands.
2a. **CORNETTINO CURVO**, in D, 14th—17th century The German **ZINK**; the old English **CORNET**.
2b. **CORNETTO CURVO**, in A, German, 17th century.
3a. **CORNETTINO DIRITTO** (of horn), in D, length 18 inches, English, 17th century.
3b. **CORNETTO DIRITTO** (muto), in G, length 27½ inches, German, 17th century.

4. Corno Torto or Bass Cornet, in C, Italian, 17th century.
5. Serpent, by Baudouin, French, c. 1700.
6. Bass Horn, English, c. 1800.
7. Keyed Bugle by Metzler, London, c. 1820.
8. Ophicleide, English, c. 1820.

Plate VII.—THE VIOLIN FAMILY.

1. Rebab (a monochord) and Bow, Arabian.
2. Trumpet Marine (with sympathetic strings) and Bow, height 76 inches, French, 17th century.
3. Rebec and Bow, 14th—16th century.
4. Crwth and Bow, by Owain Tudwr, Dolgellau, Welsh, 19th century.
5. Sordino or Kit, French, 17th century.
6. Viol (5 strings), by Fleury, Paris, 1764.
7. Viol (6 strings), by Henry Jaye, Southwarke, 1632.
8. Tenor Viol (6 strings), Italian, 17th century.
9. Bass Viol (7 strings), French, c. 1700.
10. Viola d'Amore (with sympathetic strings) and Bow, by Giov. Grancino, Milan, 1696.
11. Hurdy-Gurdy or Vielle, French, 19th century.

Plate VIII.—THE LUTE FAMILY.

1. Kissar (5-stringed Lyre), Egyptian.
2. Lute with recurved head, Italian, 17th century.
3. Theorbo, by Mathye Hoffman, Antwerp, 1619.
4. Archlute, by Magnus Tieffenbrücker, Venice, 1589.
5. Chittarone (length 76 inches), by Magnus Steger (?), Venice, c. 1620.
6. Pandurina, by Michael Angelo Bergonzi, Cremona, 1756.
7. Pandore, Italian, 17th century.
8. Cittern, by Peter Wisser, German, 1708.
9. Gittern, Italian, 17th century.

PLATE IX.—THE HARP FAMILY.

1. NANGA (5-stringed HARP), Egyptian.
2. SMALL IRISH HARP (KEIRNINE), Irish, c. 1700.
3. LARGE IRISH HARP (CLARSETH), by John Kelly, Irish, 1734.
4. MINSTREL HARP, Flemish, 17th century.
5. WELSH HARP (height of pillar 69 inches), by John Richards, of Llanrwst, Welsh, c. 1750.

PLATES X., XI., AND XII.—THE HARPSICHORD FAMILY.

1. PSALTERY (KANOON), Arabian.
2. CLAVICYTHERIUM (height 44 inches), Italian, c. 1620.
3. VIRGINAL, by Giov. Domenico, Venice, c. 1550.
4. SCHEITHOLT (Epinette des Vosges), French, c. 1800.
5. SPINET (length 64 inches), by Marcus Jadra, Italian, 1552.
6. SPINET, by Baker Harris, English, c. 1750.
7. HARPSICHORD (length 8ft. 6in.), by Josephus Kirchman, London, 1798.

PLATE XIII.—THE PIANO FAMILY.

1. DULCIMER, Chinese.
2. CLAVICHORD (fretted, length 46 inches), Italian, 16th century.
3. CLAVICHORD (not fretted), by J. C. Jesse, Halberstadt, 1765.
4. KEYED CITTERN, by Preston, English, c. 1800.

PLATE XIV.—THE ORGAN FAMILY.

1. SYRINX or PAN-PIPES, Arabian.
2. CHENG, a reed organ for the mouth, Chinese.
3. BIBLE REGAL (breadth 28 inches), German, 17th century.
4. PORTABLE ORGAN (POSITIVE), German, 17th century.

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ANCIENT MUSICAL INSTRUMENTS.

Introduction.

THERE are few recreative studies more fascinating than the history and development of musical instruments. To trace the pedigree of a fine old violin, or to work out the stages in the evolution of the organ, or the pianoforte—the former from the Syrinx or Pan Pipes, and the latter from the Dulcimer and Psaltery—is a labour of delight to many persons whose daily duties are more or less of a mental strain, and whose brain requires a special kind of pacific antidote to neutralise the effects of the high pressure work of this go-ahead age. To me the study of old violins and the history of the great masters of Brescia and Cremona has been the greatest relief in my hours of relaxation. Rest is not idleness, and music—the most ennobling of all the arts—although its study entails earnest application, yet the overwrought brain can turn to it and find rest from its soothing influence. I have mentioned the violin as having engrossed nearly all my spare time for some years, but although this instrument must always take precedence in point of interest, especially to those persons who wield the bow, there are many other instruments now in use whose ancestry affords much instruction and amusement to all who carefully study their history. There is, however, more than one obstacle which crosses the path of the would-be student of early musical instruments. The first is the very high price of the books dealing with the subject: and secondly, the proper classification of the instruments in families in a single work. Wind instruments are treated by one authority, and stringed instruments by another, and it seems to me that, through the want of some cheap and reliable guide containing illustrations in an evolutionary series, the proper study of musical instruments is neglected, save by the few great authorities whose works are beyond the reach of the majority of students. And it is to endeavour to supply this want that I have been tempted to compile this little book.

Some time ago, I had the good fortune to meet the Rev. F. W. Galpin, M.A., Vicar of Hatfield Broad Oak, Essex, a gentleman who has made a special study of ancient musical instruments, and whose collection of valuable specimens cannot be surpassed in this country. In his vicarage are to be found about 300 early instruments, all in a perfect state of preservation, and, what is still more remarkable, each contrivance is in playing condition. There is a very good collection of ancient instruments in the South Kensington Museum; but the most accomplished virtuoso could not make many of the specimens respond to his touch. There are virginals, spinets, clavichords and harpsichords, viols d'Amore and viols da Gamba, all capable, ages ago, of discoursing most eloquent music, now unstrung, out of tune, and harsh. Mr. Galpin's specimens, on the contrary, are strung and in tune, each instrument is in playing condition, and by his own ingenuity and skill they are restored to their original condition and tone. The reader will probably exclaim, "What is the use of having 300 ancient instruments ready for the performer's touch when there is not likely to be any person or persons within a thousand miles of Hatfield Vicarage able to make them speak?" Gently, dear reader—do not jump at hasty conclusions; the reverend student of ancient music has not been spending his leisure moments with those relics of the past for years merely to be able to say that they are in perfect condition. Mr. Galpin has learnt their gamut, and he can play a solo on each of his three hundred treasures. Musicians will easily understand the magnitude of the task the enthusiastic collector set himself to perform, for there are few virtuosi able to play even a short solo first on the oboe, then on the trombone, followed by the bagpipes and the hurdy-gurdy, then running through the stringed instruments, starting with the monochord and ending with the viola d'Amore; sitting down at the harpsichord to give his hearers a taste of Handel on the instrument for which the music was written, then making the organ peal forth the glorious marches of Mendelssohn.

These are only a few of the many treats afforded me when I visited Mr. Galpin, and I was so impressed with the instruments and their owner, that I conceived the idea of recording, by means of an Edison-Bell Phonograph, the tones of a large number of ancient instruments. Mr. Galpin seemed pleased with the idea, and offered to arrange the instruments in families. The records of Mr. Galpin's performances were successfully made, and then the Vicar of Hatfield Broad Oak, who is a skilful amateur photographer, produced the illustrations which will appear in this book, arranged in the following systematic manner:—

1. The Flute Family.
2. The Oboe Family.
3. The Clarinet Family.
4. The Bagpipe Family.
5. The Horn Family.
6. The Cornetto (Ophicleide) Family.
7. The Violin Family.
8. The Lute Family.
9. The Harp Family.
10. The Harpsichord Family.
11. The Piano Family.
12. The Organ Family.

One hundred and eight early musical instruments, arranged in fourteen artistic groups, will be illustrated in these pages.

There can be no doubt as to their accuracy, for they have been photographed by Mr. Galpin directly from his valuable specimens, and they now appear for the first time. In the index of illustrations, the measurements of prominent members in each group have been given as a scale for the plate in which they appear.

WILLIAM LYND.

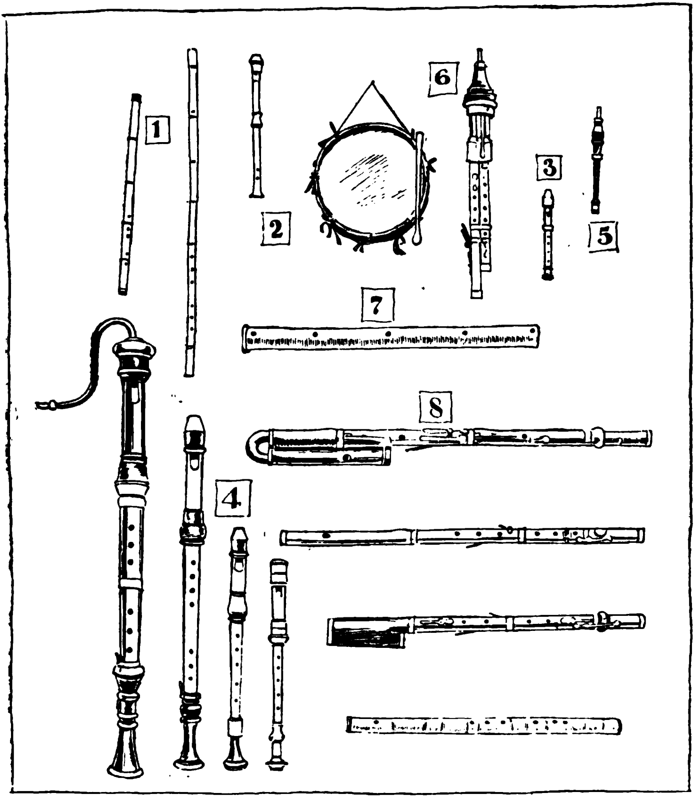
LONDON,
January, 1897.

The Flute Family.

The origin of the Flute is lost in antiquity. The Nay, or Egyptian Flute (Fig. 1), is a very ancient instrument, which is represented on Egyptian monuments. It was played in a curious manner. There was no blow-hole like that of the modern flute; it was sounded at one end by the performer blowing through a small aperture of his lips against the edge of the tube. There being no artificial contrivance to assist the player, it was not easy to produce a good tone.

Two specimens of the Nay are shown (Fig. 1), the only difference being in the length of the tubes.

The Pipe and Tabor (Fig. 2) were the ancestors of the fife and drum. The pipe was blown at the end in whistle fashion and played by the left hand. Though



THE FLUTE FAMILY.

having only 3 holes, a scale of nearly 2 octaves could be produced by the use of harmonics.

The tabor was a small drum slung by a short string to the waist, or left arm, and tapped with a small drum-stick. One can imagine the pipe and tabor being played at rustic dances in the sixteenth century. There is an old print in existence representing three minstrels, one playing the pipe and tabor, a second a kind of shawm, and the third a small harp. The pipe and tabor were used in England as late as the early part of the present century. The Flageolet (Fig. 3) is a whistle headed flute, and it was played by ladies in the seventeenth century. Pepys, in his diary (March 1, 1666), records: "Being returned home I find greeting the flageolet master come and teaching my wife and I do think my wife will take pleasure in it, and it will be easy for her and pleasant." The flageolet was made of various sizes. The smallest size was called the bird pipe

(Fig. 5), and Fig. 6 is the double flageolet. Another reference is made to this instrument by Pepys (Diary, January 20, 1667): "To Dumbleby's, the pipemaker, there to advise about the making of a flageolet to go low and soft, and he do show me a way which to do, and also a fashion of having two pipes of the same note fastened together so as I can play on one and then echo it upon the other, which is mighty pretty."

The RECORDER.—In Shakespeare's tragedy of *Hamlet*, Act III., Scene 3, the Danish Prince calls for music, exclaiming, "Come, some music! Come the recorders!" and after a short scene with Rosencrantz and Guildenstern, the players enter with old English beaked flutes. Hamlet takes one, and offering it to Guildenstern, says: "Can you play upon this pipe?" I have witnessed many representations of *Hamlet*, but I have never seen a proper recorder, or *flûte à bec*, used in the scene above mentioned. It is the custom to give Hamlet a transverse flute, or fife. The Recorder (Fig. 4), or beaked flute of Shakespeare's time, is scarce. Indeed it is difficult to find a good specimen. It was made of various lengths, viz., treble, tenor, alto and bass. The bass flute was so long that a bent tube similiar in appearance to that of the bassoon was fixed to the mouthhole, in order to enable the player to reach the finger-holes.

The most common flûte à bec was made with seven finger-holes, and it had a compass of about two octaves. There was often a key in addition to the holes. The recorder was so great a favourite in England that it was called in France "La Flûte d'Angleterre." It was supplanted by the transverse, or German flute (Fig. 8), which was introduced into the orchestra by Lulli, and it came into general use in the time of Handel. Fig. 8 shows the treble, alto, tenor and bass transverse flutes.

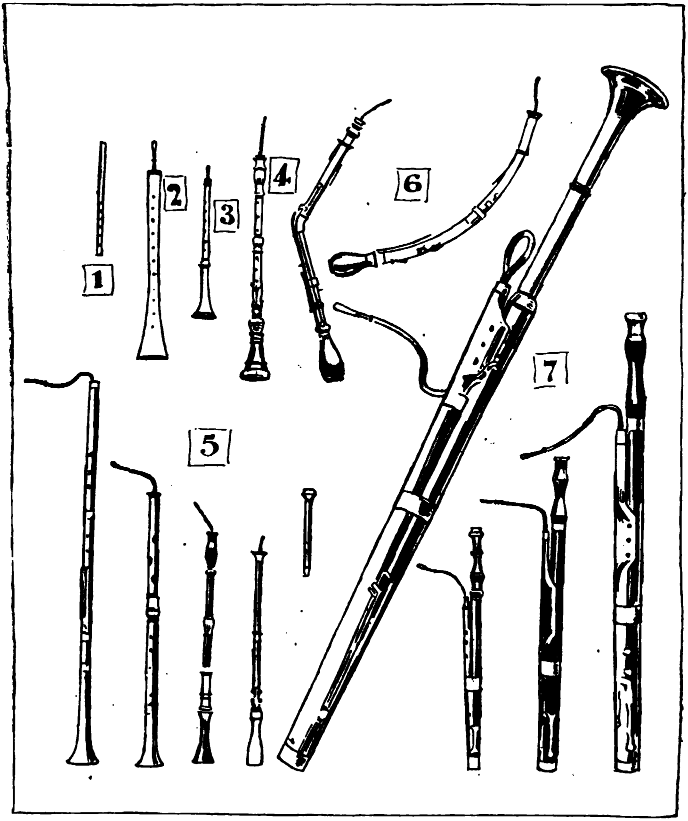
The earliest form of Transverse Flute

(Fig 7) was the nose flute of the Fiji Islanders, blown from the nose instead of the mouth. Happily, that instrument was not introduced into civilised countries. The modern flute was invented in 1832 by Theobald Böhm, a Bavarian flautist. He entirely remodelled the instrument, and proved that in order to produce purity of tone the holes must be arranged in their correct theoretical positions. The flute has been modified since Böhm's time by Clinton, Pratten, and Carte. The Piccolo, or Octave Flute, is exactly an octave higher than the flute, excepting the two lowest notes, of which it is deficient. Hipkins, one of the greatest of English authorities on musical instruments, says, "The piccolo is very shrill and exciting in the over-blown notes, and without great care may give a vulgar character to the music, and for this reason Sir Arthur Sullivan has replaced it in the score of *Ivanhoe* by a high G flute. The old cylindrical ear-piercing fife is an obsolete instrument, being superseded by a small army flute, still, however, called a fife, used with the side drum, in the drum and fife band."

The Oboe Family.

(*Double Reeds.*)

THE Aulos, or Tibia (Fig. 1) of the ancient Greeks, unlike the pipes of the Egyptians, had as mouthpiece a double vibrating reed, so that it must be classed with the members of the oboe family. There was the Monaulos, or single pipe, and the Diaulos, or double pipe. The player had a curious contrivance called a Phorbeia, a kind of leather bandage tied over his mouth, with two holes through which the tubes could pass. It is supposed that the phorbeia was contrived to enable the player to blow into the tube with greater force. There is in the British Museum a diaulos which was found in a tomb at Athens. The reed employed in instruments of this family was originally made of a flattened oat or



THE OBOE FAMILY.

wheat straw. The diaulos in the British Museum has tubes made of cedar wood, 15 inches in length. Each tube has a separate mouthpiece and six finger holes, five of which are at the upper side and one is underneath. Mr. Galpin played upon the Aulos a Pythian air, the music of which was found at Delphi. The Persian Zamr (Fig. 2) is supposed to be the parent of the Schalmey, or Shawm (Fig. 3). The schalmey derived its name from *calamus*, the Latin for reed. It is probable that the Romans introduced it into Western Europe. The Hautbois, or Waight (Fig. 4), is directly descended from the schalmey. It obtained its English name from being used by watchmen, or waights, to proclaim the time of night. After a short solo on the "hoboy," the watchman would sing something like the following: "Past three o'clock, and a cold and frosty morning," "Past three o'clock, good morrow masters all." One can hardly fancy a modern policeman playing a solo on the oboe in the middle of the night and chanting the hour. We are fortunate in having the waits once a year instead of every night, as in "ye olden time." The knee-shaped instruments (Fig. 6) were called Hunting Oboes, or Oboi di Caccia; they differed but slightly from the Cor Anglais, or English horn, an instrument used in the modern orchestra. To it Rossini has given the beautiful Ranz des Vaches, imitating the Alpenhorn in the overture to *William Tell.* Like the flute, there was a complete family of oboes in the sixteenth and early in the seventeenth century (Fig. 5); the short tube on the right of Fig. 5 is an extra joint to alter the pitch. The bassoon (Fig. 7; four specimens) is the legitimate bass to the oboe and to the wood wind in general. It was evolved in the sixteenth century from the Pommers and Bombards, the tenors and basses of the shawm family. The shape may also have been suggested by Afranio, a canon of Ferrara, who in 1539 constructed a "Phagotum." Various bassoons were in use about two centuries ago and earlier—the treble or dulcian, the tenor or tenoroon, the bass or bassoon, and the double bass or contra-bassoon. The latter is the largest species and sounds an octave lower than the ordinary bassoon. It extends a fourth lower than the four-stringed double bass, and is, therefore, the deepest-toned instrument in the orchestra. The bassoon is turned back upon itself to economise length. In Italy and Germany it is called Fagotto, or Fagot, from its slight resemblance to a bundle of sticks.

The Modern Oboe is the result of improvements made by M. Barret, a distinguished artist and ingenious mechanic, seconded by M. Triebert, the French instrument maker. The instruments of the latter have almost monopolised the trade (Hipkins).

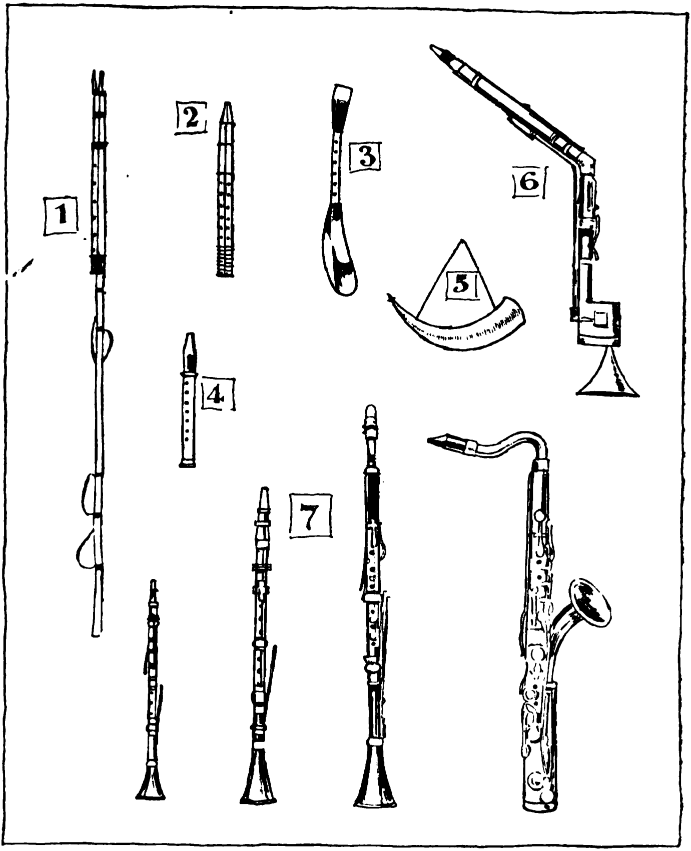
Reed instruments fall into two distinct groups, played respectively with a double reed or with a single reed. In double-reed pipes (the Oboe Family) the sound is produced by the rapid movement of two thin slips of reed or cane vibrating against one another. In the single-reed pipes (the Clarinet Family) a single slip vibrates against the natural tube of the cane or a wooden mouthpiece.

In the Bagpipe Family a combination of these principles is found, the Chanter pipe having a double reed, while single reeds are generally found in the drones.

The Clarinet Family.

(*Single Reeds.*)

THE first instrument (Fig. 1) of this interesting family is the Egyptian Arghoul, a double pipe, each tube having a single vibrating tongue of cane. The short tube which has the finger-holes serves for the melody, while the long tube acts as a drone. In this instrument we appear to have the origin of the bagpipes. The arghoul is occasionally played by the boatmen on the Nile. The Zummarah (Fig. 2) is contrived with two tubes of equal length, each pipe having six finger-holes. Mr. Flinders Petrie, while excavating, at Fayoum, the tomb of an Egyptian lady, found two such reed pipes. Mr. Petrie dates these pipes about 1100 B.C. The zummarah is an Egyptian instrument, and must not be mistaken for Zamr, the Persian oboe. The horn-pipe, or Pibgorn (Fig. 3), was formerly popular with the rustics in Wales. It is made of horn, measures about eighteen inches in length, and has seven finger-holes. The reed inside it resembles the reed of the clarinet. The pibgorn was met with in the Island of Anglesey, where it was played by the shepherds. A country dance, termed "hornpipe," derived its name from being commonly danced to this instrument, pibgorn signifying hornpipe. The Chalumeau (Fig. 4) was in use in Europe about the twelfth or thirteenth century. It was sounded by a single reed laid upon the upper side of a beak-like mouthpiece; the fingering of the instrument was the same as that of the double-reed schalmey. Johann Christopher Denner, of Nuremberg, while experimenting in 1700 with the chalumeau, discovered the principle of the clarinet; but although Denner's discovery led to the construction of the beautiful contrivance



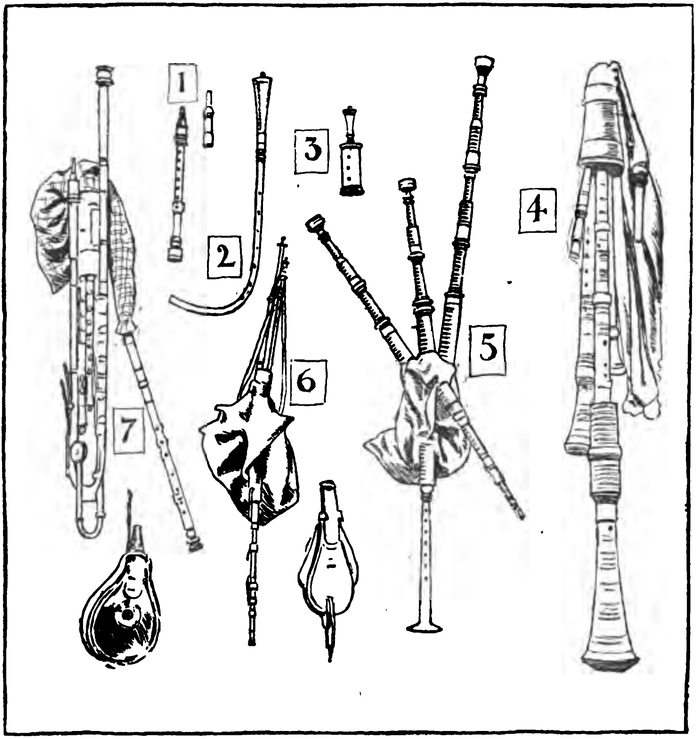
THE CLARINET FAMILY.

which is now considered the most valuable of the wind instruments, it was a century and a-half before it reached its present state of perfection.

The name clarinet is derived from the high trumpet, which was anciently called clarion or clarino; and as the tone of the new instrument was of somewhat similar brilliancy, though in size it was smaller, it received the name of clarinetto, or "Little Clarion." Fig. 5 represents the South American reed-horn, a predecessor of the saxophone; and Fig. 7 four specimens of the clarinet group—viz., small treble, ordinary clarinet, tenor, and bass. Fig. 6, The Basset Horn, or Corno di Bassetto, is a tenor clarinet with additional low notes. It was invented at Passau, Bavaria, in 1770.

The Bagpipe Family.

The Bagpipe is one of the most ancient instruments in the world. A Syrinx, with bag or bellows, is represented on one of the ancient terra-cottas excavated in Tarsus, Asia Minor, some years ago. These remains are believed to be 2,000 years old. This is probably the oldest representation of the bagpipes hitherto discovered. The bagpipes were known to the Romans as the Tibia utricularis, said to be a favourite instrument of the Emperor Nero. The bagpipes were played in Persia in the sixth century. In Scotland and Ireland it is regarded as an old national instrument. Some centuries ago it appears to have been also very popular in England. Shakespeare alludes to the Lincolnshire bagpipe in Henry IV., Part I. The Northumbrian, or English bagpipe



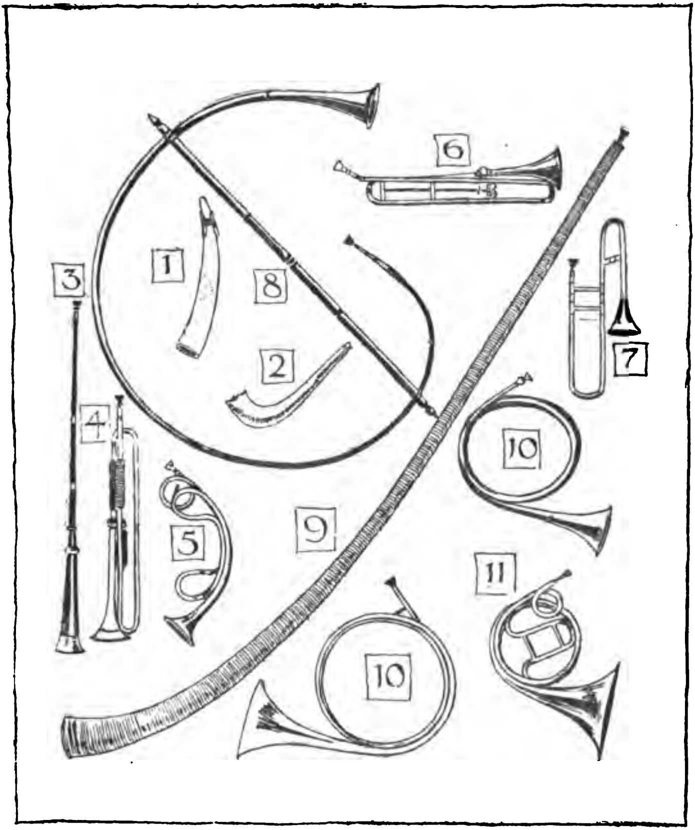
THE BAGPIPE FAMILY.

was supplied with bellows and 4 drones of ivory, the chanter of ebony, and provided with silver keys. The earliest Irish pipes were played from the mouth, but during the last century bellows were added, and also keys to the 3 drones, which, when pressed by the left elbow, supplied a rude sort of accompaniment. Fig. 1 represents a pastoral pipe, with the reed under a cap, through which it is played. No. 2 the Krumhorn, or Cromorne, which is sounded in the same way, and is supposed to have been the origin of the organ "Cremona" stop. No. 3, The Racket, or Sausage Bassoon, a little instrument only 5 inches long, but possessing a compass of two octaves from the lowest C of the Bassoon or Violoncello. Fig. 4, Italian bagpipe (cornamusa). Fig. 5, the Northumbrian bagpipe. Fig. 6, the Highland Scottish pipes; and Fig. 7, Irish pipes with bellows. The Irish had formerly two kinds, a large one for war purposes, and a smaller one for peace. The drones of the bagpipes produce always the same sound, and serve as a perpetual bass for every tune. Hipkins describes the bagpipes as the organ reduced to its most simple expression.

The Horn Family.

THE African War Horn (Fig. 1) is a popular instrument in Senegambia and Guinea, in Central and Eastern Africa. It is carved out of an elephant's tusk, which is carefully hollowed, and a mouth-hole is cut in the inner side towards the narrow end. Some of these trumpets are of enormous size and have a powerful tone. In Ashantee and some other districts every chief has his trumpeter, who announces the approach of his master by a special signal, which has a meaning well known to the people. The signal of one chief means, "I am the great King's son"; that of another, "No one dares trouble me," and so on. When Bowdich visited Ashantee the flourish blown by the king's trumpeter was interpreted to him as proclaiming the sentence, "I pass all kings in the world." (Engel.)

The SHOFAR (Fig. 2), or ram's horn trumpet, is the only Hebrew musical instrument which has been preserved to the present day in the religious service of the Jews. It is still blown in the synagogue, as in times of old, at the Jewish New Year's festival, according to the command of Moses (Numbers xxix. 1): "And in the seventh month, on the first day of the month, ye shall have an holy convocation; ye shall do no servile work: it is a day of blowing the trumpets unto you." The Roman lituus had the same shape as the shofar. The Straight Trumpet or Tuba (Fig. 3), in the Galpin collection is dated 1460. Fig. 4 is a trumpet of the seventeenth century; Fig. 5, a hand trumpet; and Fig. 6, a slide trumpet. The trumpet has a very brilliant tone; it is still used in oratorio, and as an instrument of court and state functions. The Sackbut (Fig. 7) resembled a trombone, and being provided with a slide, could be drawn out to give extra notes and a complete scale. The



THE HORN FAMILY.

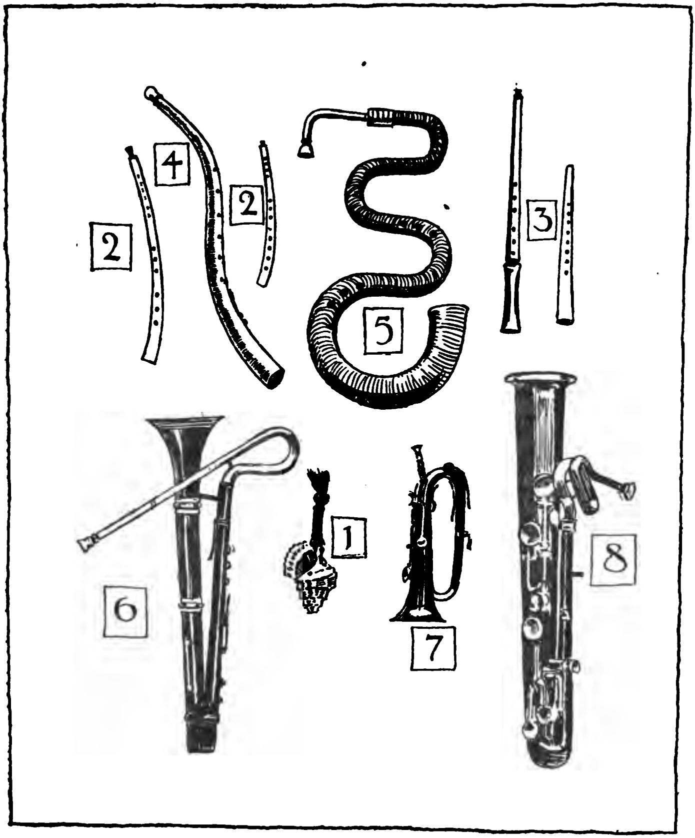
Cornu, or Buccina of the Romans (Fig. 8), as well as the straight trumpet, or Tuba, were employed in war to convey signals.

The ALP HORN (Fig. 9), ten feet long, is made of red willow, neatly covered with white willow bark. It is used by the Swiss for calling the goats. Fig. 10 illustrates two hunting horns of the seventeenth century, and Fig. 11 an early form of French Horn, in which the pitch of the natural notes was altered by the insertion of the hand into the bell as in the hand Trumpet (No. 5). These devices, and those of the next section, have now been in a great measure superseded by the invention of valves in the early part of this century, which has given us the Cornets and Saxhorns of the modern Brass Band.

The Cornetto or Ophicleide Family.

The Conch (Fig. 1) is a Shell trumpet, and the most ancient instrument with a mouthpiece. It was used originally for war calls, and later for religious and civil ceremonies. The Buddhists employ the conch in their temples. The oldest and most universally known trumpets are those which are made of a large shell, or the horn of an animal. The former is, as might be expected, more generally found on islands and in those districts of a continent which have a sea coast (Grove). The conch is usually blown through a small hole, which has been made for the purpose through the spiral end. In some instances, the hole is provided with an artificial projection, made of wood or some other suitable substance, or a tube is inserted to facilitate blowing, and sometimes by a hole bored in the side an additional note is obtained. The Cornetto, or Zink, is a very old instrument. It consists of a wooden tube slightly conical, covered with leather, having six holes for the fingers, and one hole for the thumb on the other side, while the tone is produced through a cup mouthpiece similar to that of a trumpet. About the fifteenth and sixteenth centuries cornetti, or zinken, were most important instruments in the wind bands. Their powerful tone combined well with that of trombones, and bands consisting mainly of these two kinds of instruments were great favourites both at public and religious ceremonials. Many ancient writers mention the cornetto in terms of great praise. These instruments were made of various lengths and shapes so as to form a complete choir of themselves. Fig. 2 shows the Curved Zinken, Fig. 3 Straight Cornetti, and Fig. 4 the Bass Zink. The Serpent (Fig. 5) is the invention of Edmé

Guillaume, a canon of Auxerre in France, A.D. 1590. It was, however, no new invention, properly speaking, but merely an improvement upon the old bass zinken, the management of which was rendered more convenient by giving a serpentine winding to the tube. This instrument subsequently became popular. It was used in military bands and in processions until about the middle of the present century. The French made use of it, also, in churches to support the voices. In course of time keys were added to the serpent, and when changed into the bassoon shape its name changed to the Russian bass horn, or Basson Russe. Fig. 6 is the Bass Horn, and Fig. 7 is the Keyed Bugle, Fig. 8 the Ophicleide. A Parisian instrument-maker, Halary, in 1817 made the Bass Horn a more perfect instrument, and called his improvement the ophicleide, from two Greek words meaning "serpent" and "keys"—"Keyed Serpent," although it more was like a bass keyed bugle (Grove).



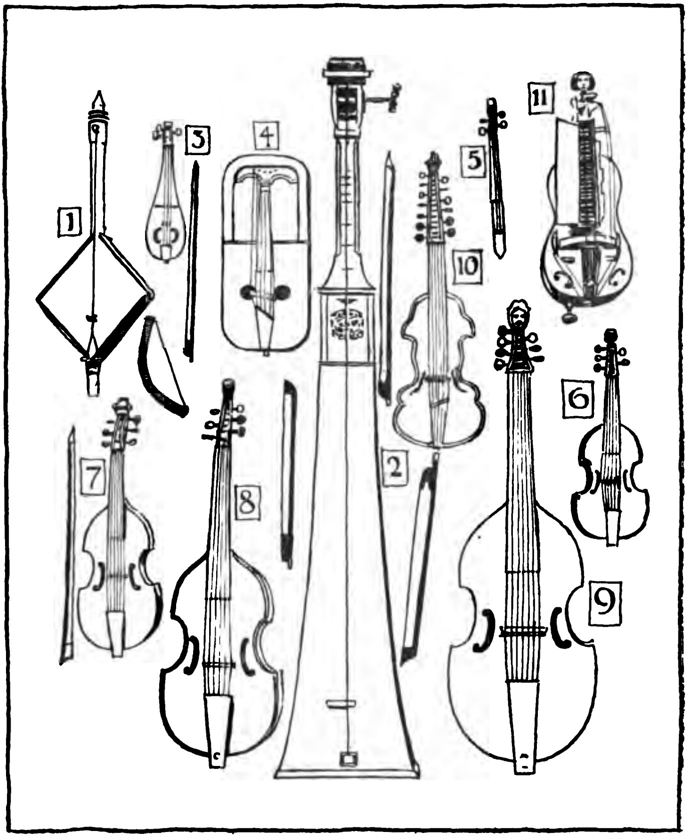
THE CORNETTO FAMILY.

The ophicleide has been superseded by the development of the valved tubas. The Euphonium and Bombardon, the basses of the important family of Saxhorns, now completely cover the ground of bass wind instrument music.

One objection to the Cornetto family was that though the notes were good when the sound issued from the bell of the instrument, the intermediate notes, issuing through the holes, were weak and husky. In the valved instruments the valve, which acts as a tap when turned or depressed by a lever, directs the wind into additional lengths of tubing, and allows it to return into the instrument: in this way every sound issues from the bell. The Cornopæan or Cornet-à-piston, invented about 1815, has therefore little affinity with the old Cornetto; even its mouthpiece, though of the same kind, being of a very different shape.

The Violin Family.

THIS group will doubtless be the most interesting family to the majority of the readers of these articles. There is a strange fascination about the king of musical instruments. All persons who have studied the violin, and who love that wonderful contrivance, must feel an interest in tracing its gradual development. The violin has been evolved from the ancient monochord, and Fig. 1, the Rebab or Arabian one-stringed fiddle, is indeed a monochord played with the bow. The Tromba Marina, or Marine Trumpet, Fig. 2, is a direct descendant of the monochord. It will not be out of place here to describe briefly the first stringed instrument, said to have been invented by Pythagoras, 600 B.C. It consists of a long box of thin wood, with a bridge fixed at each end,



THE VIOLIN FAMILY.

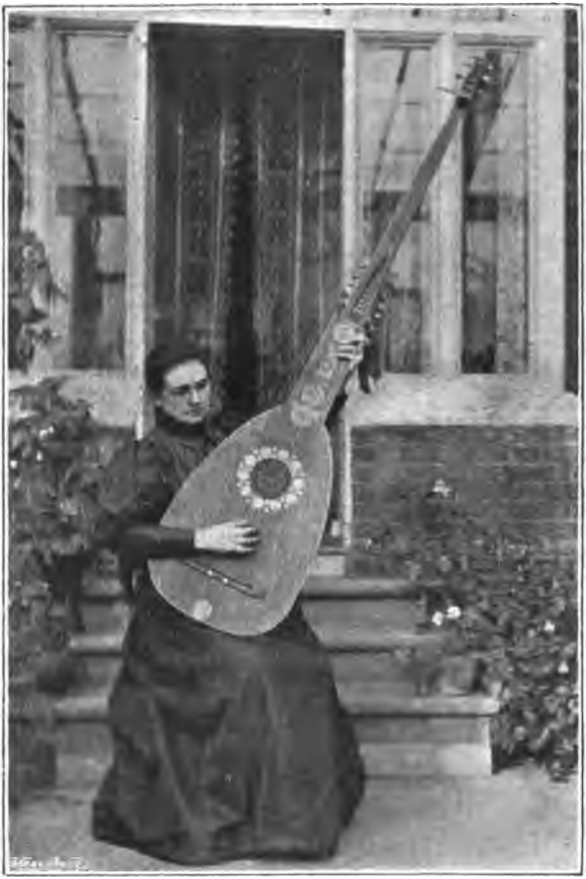
over which is stretched a wire or catgut string; a moveable bridge is placed on the box, and serves to stop off different lengths of string in order to compare the relative sounds they produce. The principle of dividing a string to obtain different sounds was applied in the Egyptian lute earlier than 3000 B.C. To return to the tromba marina, this development of the monochord is played with the bow, and by some authorities is considered to be the oldest bowed instrument known, and the archetype of all the others. The country of its origin is unknown (Grove). It was once extensively used in Germany and France as a popular instrument, and it was employed in the service of the Church. It was almost disused early in the last century. The total length of the tromba marina is usually about six feet. The string is a very thick violoncello string stretched over a curious bridge. The marine trumpet is played with a heavy 'cello bow. Played by stopping in the ordinary way, this instrument produces tones of a most distressing nature. It is properly played wholly in natural harmonics. Grove, in his Dictionary of Music, says: "The facility with which the marine trumpet yields the natural harmonics is due to its single string and lopsided bridge. Paganini's extraordinary effects in harmonics on a single string were, in fact, produced by temporarily converting his violin into a small marine trumpet. That a great player placed his single fourth string on the treble side of the bridge, and, leaving the bass foot of the bridge comparatively loose, he then produced a powerful reedy tone, and obtained unlimited command over the harmonics. The marine trumpet was anciently used as a street instrument by mendicant musicians, and those who have heard it will agree with an ancient author that it sounds best at a distance. The name of marine trumpet was probably given to it on its introduction to Italy on account of its external resemblance to the large speaking-trumpet used on board Italian vessels, which is of the same length and tapering shape." Another authority believes that, considering this instrument was used by nuns, there is greater reason to suppose that tromba marina is a corruption of tromba Mariana, implying a trumpet played in honour of the Virgin Mary. It was played by nuns to replace the real trumpet during musical performances in the cloisters. Trumpeters were not permitted to visit the nunneries; the nuns had therefore to use this instrument as the best substitute for a trumpet which could be devised.

The REBEC, or three-stringed fiddle (Fig. 3), is a descendant of the rebab, an arab instrument of the violin class (Fig. 1). The rebec was in use throughout Western Europe in the Middle Ages. In shape it resembles the mandoline. Its tone is loud and harsh, and it was used in the state bands of Henry VIII. Shakespeare's musicians in *Romeo and Juliet*, named by the great poet, Hugh Rebec, Simon Catline, and James Soundpost must have been rebec players. The rebec became a street instrument after the introduction of the viol and violin. When played at village festivals it was accompanied by the drum and tambourine. Some curious laws relating to the rebec were in vogue in France, even as late as the last century. In 1742 Guignon, who was styled Roi des Violons (King of Violins), issued an order prohibiting street musicians from using the violin. The notice was as follows:—"Il leur sera permis d'y jouer d'une espèce d'instrument à trois cordes seulement et connu sous le nom de Rebec sans quils puissent se servir d'un violon à quatre cordes sous quelque pretexte que ce soit," which means in English that street musicians were only allowed to play upon a three-stringed instrument called a rebec, and upon no pretext whatever were they to use a violin with four strings. As far back as 1628 the instruments of the violin family were not allowed to be played in low taverns; but there was no restrictions relating to the rebec, which was certainly the street musician's instrument of that period. The rebec was extinct in England earlier than in France. It is now only seen represented in sculpture, painting, and old manuscripts. The successor of the rebec was the kit (Fig. 5).

The CRWTH (Fig. 4), or ancient British fiddle, is something like the small Roman lyre, which was introduced by the Romans into ancient Britain. The lyre was slightly modified, played with the bow, and called a crwth. This instrument is first mentioned by Venantius Fortunatus, Bishop of Poitiers, A.D. 609, and pictures of a crwth with three strings are found in MSS. of the eleventh century. The crwth in its latest form was mounted with six strings, four stretched over the finger-board and played with the bow, and two lying at the side of the finger-board plucked with the thumb of the left hand. The sound-holes are circular, and the bridge does not stand straight, but inclines to the right, and its left foot, which is 2½ inches in length (while the right foot measures only three quarters of an inch) passes through the sound-hole and rests on the back of the instrument, thus acting the part of the sound-post.

The crwth is mentioned by Davies Barrington, a Welsh Judge, who relates that he knew one John Morgan, born 1711, in the Island of Angelsey, who still played the crwth. It was also heard at Carnarvon as late as 1801, but it is now entirely out of use.

The VIOLS (Figs. 6, 7, 8, and 9).—The viol was invented in the fifteenth century and passed out of use in the eighteenth. It succeeded the mediæval fiddle and preceded the violin. The treble viol (Fig. 7) was also called Viola da Braccio, or arm viol. The large bass viol (Fig. 9) was known as the Viola da Gamba, or leg viol, and was the predecessor of the violoncello. The viol differs from the violin in having deeper ribs and a flat back which is sloped off at the top. The instrument was made in four sizes, treble, tenor, bass, and double bass. The last indeed is still in use, for as the double bass of the violin it is often seen in the modern orchestra. The viols are tuned in thirds and fourths instead of fifths. They lack the brilliancy of tone of the violins. The viola da braccio, or tenor viol, had originally six strings. The sixth string was dropped in the last century. The viols were at first used to assist the vocalists. They had frets made of catgut so that the player's art was restricted and cramped by those clumsy devices. The fine gradations of tone and emphasis of the violinist and 'cello player of to-day were unknown to the performer on the viol. Quite recently Mr. Arnold Dolmetsch, a musician of distinction, has revived the use of the viols, and he has given several concerts at which the viola da gamba and the viola d'amore were played with much technical skill and expression. The **VIOLA D'AMORE** (Fig. 10) is a tenor viol with sympathetic strings. It usually had seven gut-strings. The sympathetic strings of fine steel pass through small holes drilled in the lower part of the bridge; the number varies from seven to fourteen; they were tuned in unison with the gut-string. The Rev. H. R. Haweis, in his delightful book, "Music and Morals," in his chapter on the predecessors of the violin, says that a player on the viola d'amore, when he drew the bow across the gut strings, must have "produced a kind of mixture, as when a piano is played without dampers or with a loud pedal down. Some sensuous effects unknown to us were doubtless produced in this way; but everything which tends to promote an unregulated echo is destructive of music proper just as much as a sound board which keeps echoing a speaker's voice is to that extent destructive of speech proper. Such devices invariably disappear from musical instruments and orchestras as sounds grow more and more out of noise through the discipline of art into music." The HURDY-GURDY (Fig. 11) was originally an ecclesiastical instrument, when it was called Organistrium, and it may be said to be a combination of the monochord and organ. It was played like the organ, by divided labour; the performer being solely concerned with the keyboard while an assistant supplied the rotary or grinding motion which produced the tone. The principle of the hurdy-gurdy is a viol sounded by a wheel instead of a bow. The keys are simply slides pushed back by the player, with projections to stop the strings. As the instrument is held with the keys downwards, these slides, when released, fall back by their own weight. About thirty-five years ago hurdy-gurdy players were often met with in the streets of London and Paris. I have a lively recollection of an old Spaniard who used to play in the City, while his two children danced the cachuca, and I frequently heard the hurdy-gurdy well played by an Italian who used to frequent Langham Place and the neighbouring streets in the evening. The French call the hurdy-gurdy Vielle.

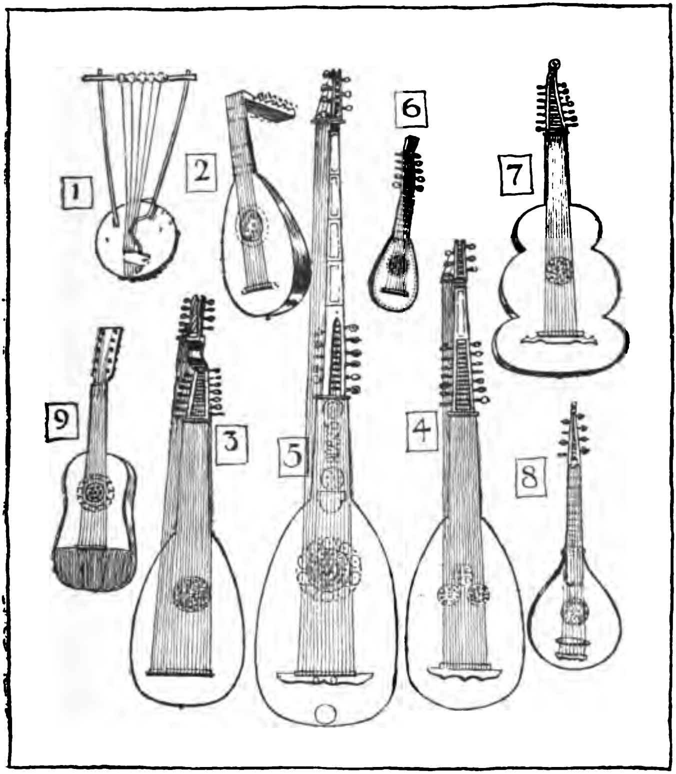


A PLAYER ON THE ARCHLUTE (CHITTARONE).

The Lute Family.

An instrument called El Oud, descended through the ancient "Nofre" from the lyre (Fig. 1), was brought by the Moors to Spain, where it is still known as the Laud. From Spain it was introduced into other European countries, and experienced various modifications. The French called it Luth, the Italians Liuto, the Germans Laute, and the English Lute. The lute of Shakespeare's time (Fig. 2) has its neck bent back at a sharp angle; this characteristic was derived from its Arab ancestor. The object of this sharp angle was to give bearing upon the nut or chief fret. The double-necked bass lute called Theorbo (Fig. 3) was invented about A.D. 1600.

The name of this instrument is, according to some accounts, derived from the name of its inventor, a Signor Tiorba. According to others, it was invented by Bardella, an Italian, about the year 1600; others, again, attribute its invention to Hottemann, a German, who excelled as a performer on this instrument in France about 1650. Engel thinks that all these persons merely introduced some improvements in this species of Lute which is of older date than has generally been supposed. The Theorbo differs from the Lute chiefly in having two sets of tuning-pegs, the uppermost of which contains the pegs for eight bass strings, which are of considerable length and power. The Archlute (Fig. 4) is in shape similar to the Theorbo, but it had a different arrangement of strings. Several of the strings were doubled, the additional string being tuned an octave higher than the other. The Chitarrone (Fig. 5) is a Theorbo with an extraordinarily long neck, by which the length of the eight bass strings is considerably increased. The largest instruments of



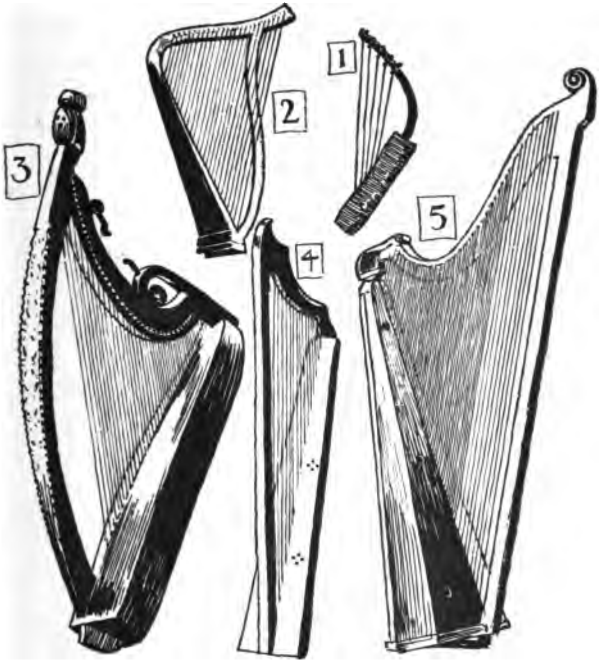
THE LUTE FAMILY.

this kind were made some centuries ago in Rome. They were used in the theatre for accompanying the voice before the Harpsichord was introduced for this purpose. The finest instruments of the Lute kind were made in Italy, especially at Bologna, Rome, Venice, and Padua (Engel).

The PANDURINA (Fig. 6) is the smallest lute, and the PANDORA (Fig. 7), with wire strings and a flat back was very popular in England 300 years ago. The CITTERN (Fig. 8), which has been called the English guitar, was strung with wire instead of gut, and the GITTERN (Fig. 9) was an early form of guitar derived from Spain, but originally introduced, like the lute, into Southern Europe by the Moors. The gittern had five double strings of wire or catgut. The Mandoline is the last remaining descendent of the lute family. It is very popular at the present time. It is, in its present form, a later development of the soprano of the mandora, as the pandurina was the soprano of the lute. The present mandoline is a Neapolitan instrument. It is tuned in fifths, like the violin, and has a fretted finger-board.

The Harp Family.

A LEGEND of great antiquity ascribes the first idea of the lyre to the god Hermes or Thoth, who, while wandering on the banks of the Nile, is said to have found the shell of a tortoise dried in the sun, and to have used it as the framework of the first musical instrument that was ever constructed, fitting it with three cords formed from the dessicated tendons of the animal. Hipkins remarks that, although the outline of the harp has varied at different epochs and in different countries, the relation of its proportions to the musical scale—a condition of symmetry in musical instruments—is in the harp very close, so that, whether it be Egyptian, Persian, mediæval, or Celtic, it is always fashioned in beauty of line and characteristically adorned. Engel infers, from the shape of the harp in its most primitive condition, that it originally consisted of nothing more than an elastic stick bent by a string. "The Damaras, a native tribe of South-Western Africa, actually use their bow occasionally as an instrument when they are not engaged in war or in the chase. They tighten the string nearly in the middle by means of a leathern thong, whereby they obtain two distinct sounds, which, for want of a sound-board, are, of course, very weak, and scarcely audible to any one but the performer. Some neighbouring tribes, however, possess a musical instrument very similar in appearance to the bow, to which they attach a gourd, hollowed, and open at the top, which acts as a sound-board. Again, other African tribes have a similar instrument, superior in construction, only inasmuch as it contains more than one string and is provided with a sound-board consisting of a suitable piece of sonorous wood. In short, the more improved we find these

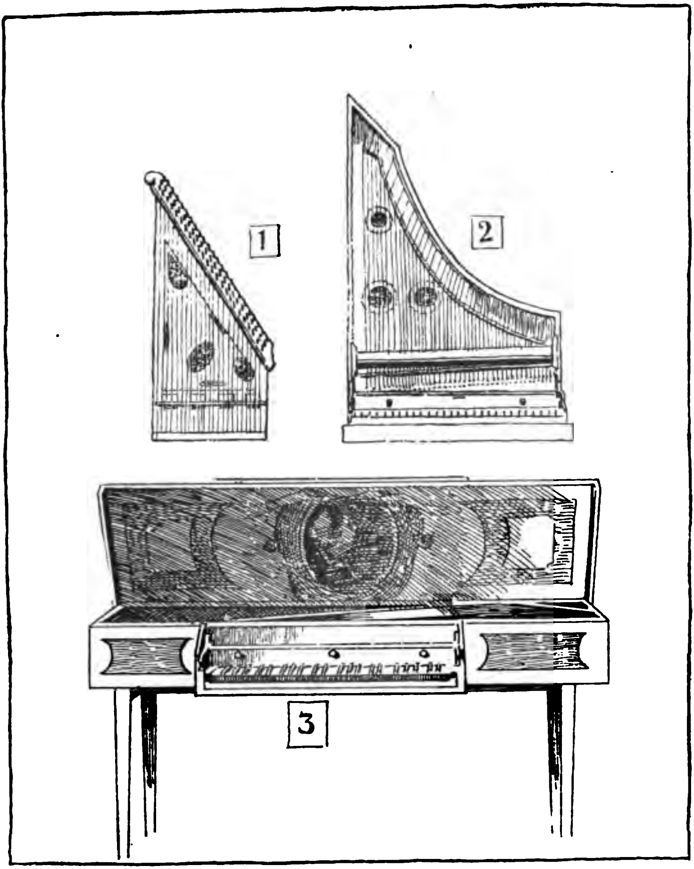


THE HARP FAMILY.

contrivances, the closer they approach our harp. And it could be shown that much the same gradual progress towards perfection, which we observe in the African harp, is traceable in the harps of several nations in different parts of the world." The oldest monuments of the harp are Egyptian. Bruce, the traveller, on entering a burial place at Thebes, discovered harps painted on the wall, supposed to be as old as the thirteenth century B.C. The Egyptian and Assyrian harps varied greatly in size, in the number of strings and in ornament. The shape of the ancient harp differed from the modern in having no pillar (Fig. 1). Dante speaks of the harp being imported into Italy from Ireland. Vincentio Galilei, in the sixteenth century, alludes to the continued excellence of the Irish in making and playing on the harp, and also ascribes the invention of the triangular harp to the Irish, and from a figure upon a coin of Cunobeline it is supposed to have been in use at least twenty-four years before the Christian era. Fig. 1 represents the Egyptian harp. Fig. 2, the small Irish harp, was a simple diatonic instrument. In order to produce a semitone the player had to place his finger upon a string, which deprived him, for the time being, of the use of one hand. A Tyrolese conceived the idea of fixing a series of little hooks into the curve of the harp, and when an "accidental" was required the player turned the hook against the string and produced the semitone. By this device he was also deprived of the use of one hand while turning and replacing the hook. In 1720 a great improvement in the harp was made by a Bavarian named Hochbrucker, who contrived the first pedal mechanism, so that the player had both hands free, while he raised the string a semitone by using his foot. The pedals in Hochbrucker's harp caused little hooks to act upon the strings. A Frenchman named Cousineau fixed each string between two pieces of metal placed beneath the bridge-pin, and by means of the pedal mechanism the metal pieces were made to grasp the string and shorten it. The perfected double-action harp was invented by Sebastian Erard in 1801, and patented in 1809. Erard's great improvement was in contriving a system of discs to act upon the strings successively with a partial revolution, the first movement of the pedal serving to shorten the strings to produce the first rise of a half-tone, and the second movement to attain the whole tone. Fig. 3 called the large Irish harp, Fig. 4 a minstrel harp, and Fig. 5 a Welsh harp with three rows of strings (two rows tuned diatonically in unisons, the third or inner row to supply the sharps and flats) are excellent specimens of ancient harps in the Galpin collection.

The Harpsichord Family.

In tracing the development of the harpsichord and pianoforte we must consider the construction and method of playing of three very ancient instruments bearing a strong family resemblance. The Dulcimer (Plate XI. Fig. 1) is still in use, and is a triangular box strung with wires, which are struck with small hammers. The Psaltery (Fig. 1) is a species of Dulcimer played with a plectrum, and the Citole, or little chest, is a similar contrivance twanged with the fingers. In each of these primitive musical instruments we have the resonant box, the prototype of the pianoforte sounding-board and the metal strings. The idea of the application of the key-board to the psaltery was undoubtedly borrowed from the organ, which was the first instrument



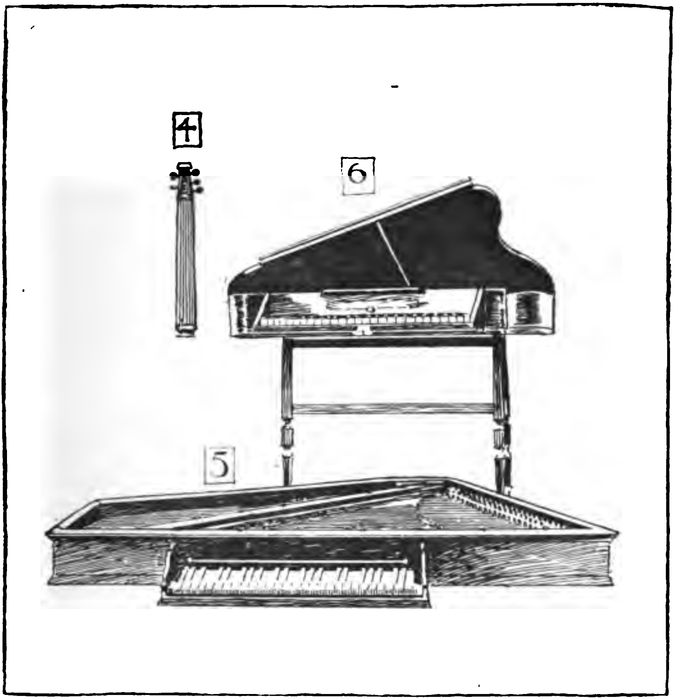
THE HARPSICHORD FAMILY.

with this device. The keyed psaltery was called Clavicytherium (Fig. 2) from clavis, a key, and cithara, a harp, and it was introduced by the Italians about A.D. 1400. Attached to a lever at the end of each key is a slip of wood called a jack, and the strings are *plucked* by means of small portions of hard leather fitted to the jacks. At about the same period was invented a kindred application of the keyboard to the dulcimer, which, called the Clavichord, had metal strings, *struck* from below by metal pins or tangents. But as the clavichord is the direct descendant of the dulcimer and parent of the modern pianoforte, a detailed description of its construction and use will follow the members of the harpsichord family.

The VIRGINAL (Fig. 3), or CLAVICYMBAL, was much in vogue in the sixteenth and seventeenth centuries. The Virginal is said to have obtained its name from having been intended especially to be played by young ladies. According to

Engel, "The statement of some writers, that it was called virginal in compliment to Queen Elizabeth, is refuted by the fact of its being first mentioned among the musical instruments of King Henry VIII., in the beginning of the sixteenth century. Probably the name was originally given to it in honour of the Virgin Mary, since the virginal was used by the nuns for accompanying their hymns addressed to the Holy Virgin." It was made in various sizes, but always small in comparison with our present square pianoforte, which it resembled in shape.

Queen Elizabeth was said to be a skilful performer on the virginal. In Shakespeare's time a virginal generally stood in the barber's shops for the amusement of their customers. The virginal is a decided improvement upon the clavicytherium. When a key is depressed, a piece of crow quill or prepared leather attached to a small block centred in the wooden jack plucks the string and sets it in vibration. When the

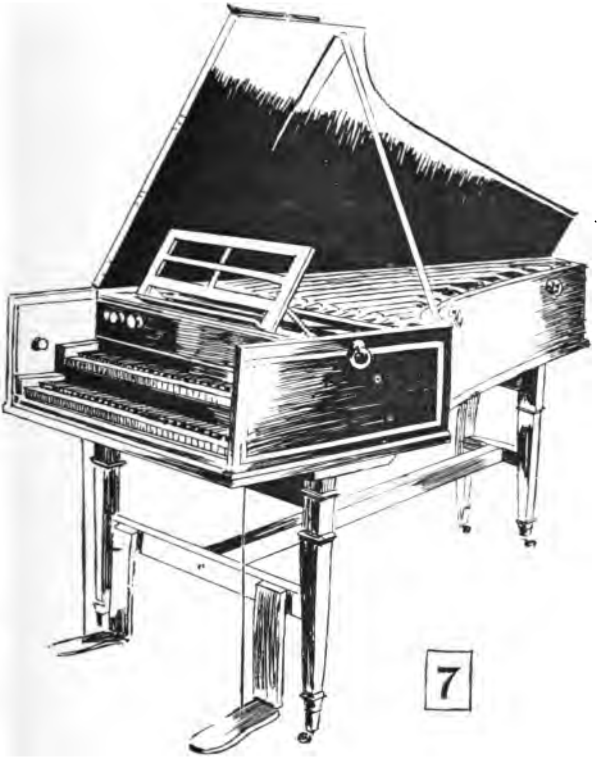


The Harpsichord Family.

key is allowed to fall, a small piece of cloth fixed in the top of the jack checks the vibrations of the string.

The SPINET (Figs. 5 and 6) is merely a modification of the virginal. It has one row of keys and one string of thin brass or steel wire to each note, and was made either in a pentagonal form (Fig. 5), or, at the end of the seventeenth century, wing-shaped (Fig. 6). "The oldest known spinet," says Hipkins, in his treatise on the pianoforte, "is dated 1490 and was shown at the Bologna Exhibition in 1888. Existing records show how much this instrument came into favour about that epoch. When, in 1509, the Chevalier Bayard, the famous knight without fear or reproach, was severely wounded at the Siege of Brescia he was carried to the house of a nobleman, whose wife and daughter nursed him and entertained him during his convalescence by playing to him upon the lute and *espinette*, as the French called the spinet. The sound was excited by a little point of quill projecting at a right angle, as described above. The name spinet is derived from spina, the Latin for thorn. Fig. 5 is an Italian and Fig. 6 an English spinet. Fig. 4 is the Scheitholt, a rustic spinet played with a quill held between the fingers, and parent of the zither.

The HARPSICHORD (Fig. 7), upon which I have heard the Rev. F. W. Galpin play Handel's music written for that instrument, is a specimen in a fine state of preservation. It has two keyboards or manuals. The lower keyboard, acting upon two sets of strings in unison and one set an octave higher, is the louder in tone; the upper keyboard, which acts on one set of strings only, is the softer. But the lower keyboard can be made to act on either set of strings separately by means of stops pressed by the hand of the performer. The strings are plucked by quills, and the principle of the harpsichord is the same as that of the virginal and spinet. M. Fetis, in his



The Harpsichord Family.

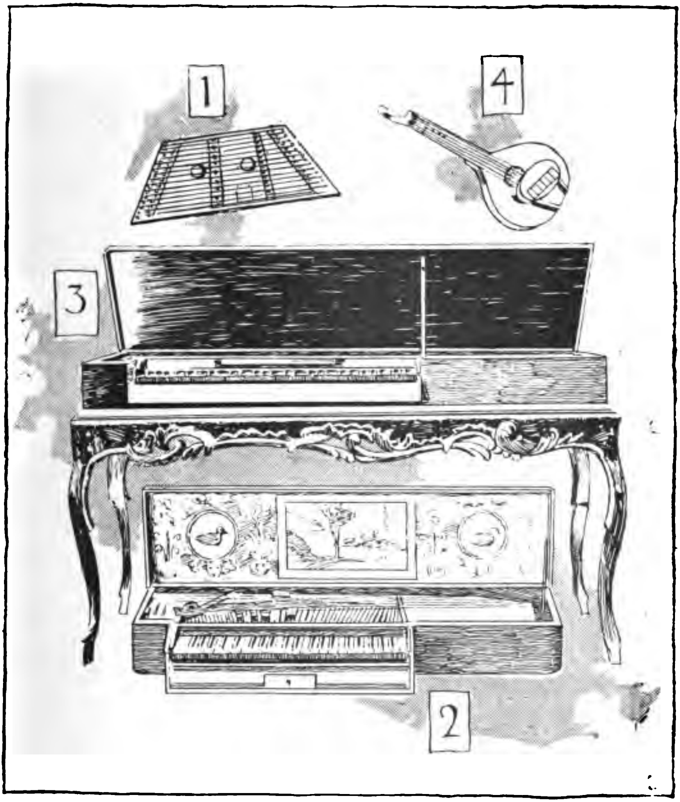
sketch of the "History of the Pianoforte," refers to the numberless attempts to make the harpsichord capable of expression in playing. He says: "Harpsichords were constructed with more than twenty different modifications to imitate the sound of the harp, the lute, the mandoline, the oboe, bassoon, flageolet, violin, and other instruments. In order to produce these different effects new rows of jacks were added, which were furnished with materials of the softest kind and most conducive to expression; and yet with all the complications of stops, springs, extra rows of keys, and Venetian swells over the strings, the grand secret—the real shading of the *piano* and *forte* were still wanting. Nothing better was devised for augmenting or diminishing the sound than to put in motion different rows of jacks, so as to withdraw them from or approximate them to the strings at pleasure." A harpsichord, which exactly resembled a grand pianoforte in outward form, cost one hundred guineas.

The Piano Family.

THE Clavichord, which must be considered as the direct ancestor of the pianoforte, derived its name from *clavis*—key, and *chorda*—a string. Its form is that of a small square piano. It has no quills, jacks, or falling hammers; the tone is produced by little brass wedges placed at the ends of the keys, which, when put down or struck, press against the strings acting both as hammer and bridge to each. The clavichord when played by a good musician was capable of some expression, described by an old writer as "of a melancholy kind, something like the effect of the close shakes on the violin." The same writer says that he had the extreme pleasure of hearing Emanual Bach touch the "favourite clavichord, in 1772, at Hamburg, when he threw away such thoughts and execution in his preludes as alone would have set up a young professor and have established the character of a great musician. In pathetic and slow passages on this instrument whenever he had a long note to colour he absolutely produced the effect of a cry of sorrow and complaint such as could only be effected on the clavichord, and perhaps by himself." The antiquity of this instrument is very great among modern musical inventions. There is a description and a representation of it cut in wood in the *Musica getutscht*, of Sebastian Virdung, printed at Basle, in 1511, but there is mention of it as a common instrument in England under the name of *clarichord* still more early. The clavichord was undoubtedly the first instrument to which mechanism was applied for striking the strings by means of hammers, and it is the direct descendant of the dulcimer. (Fig. 1.)

Fig. 2 represents a "fretted" clavichord of the sixteenth century, in which as many as four notes are formed on one string, while in the "fret-free" clavichord (Fig. 3), introduced in 1720, each note has its own string. It was for this improved clavichord that Sebastian Bach wrote his famous twenty-four preludes and figures.

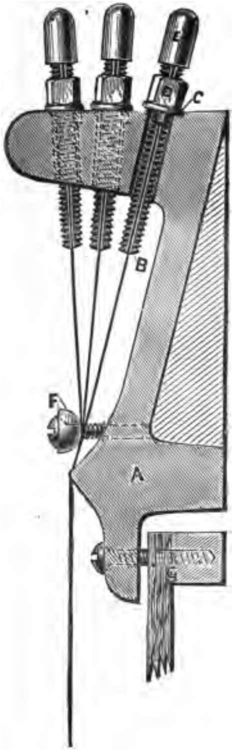
As regards the pianoforte most authorities agree that it was the invention of Cristofori, a harpsichord maker of Padua. The grand pianoforte retains the shape of the instruments which he made, and it seems impossible to conceive a better form. The shape of the square piano was taken from the clavichord. There is, however, a marked difference in the actions of the clavichord and pianoforte. The action of the clavichord was simply a piece of flattened brass wire, called a tangent, which was placed vertically at a point where it could be struck or pressed against its proper string, the right-hand division of which was free to vibrate, whilst the left-hand was muffled by a piece of cloth, the object of which was also to



THE PIANO FAMILY.

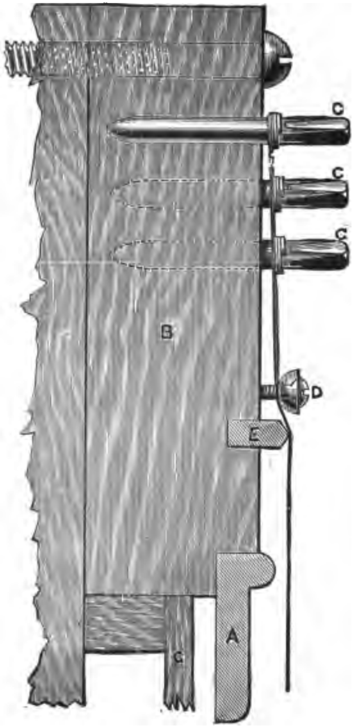
damp or stop the string, which it did the instant the finger was taken off the key. The tones of the clavichord were feeble, soft, and melancholy, and better suited to the student and composer, or the solitary, than any purposes of social amusement. The action of the square pianoforte on its first introduction consisted of a key, a lifter, a hammer, and a damper. The key was the same as that of the clavichord. The *lifter* was a brass wire with a piece of hard leather as a head. This lifter, when in motion, impelled the hammer against the string, but allowed it to rebound at once, thus enabling the string to vibrate unimpeded. The damper followed the performer and stopped the vibrations as soon as the finger was removed from the key. The tone of this pianoforte was thin and wiry, the hammer having only one slight covering of thin leather upon it. This rude idea of a pianoforte continued in use for many years, and Fig. 4 shows the application of the early piano mechanism to the cittern already described and figured under the lute family. (Plate VIII. Fig. 8.) The first improvement upon this action was made by Longman and Broderip, who brought out a contrivance having two additional parts in the action —called the hopper and the under hammer. This patent was followed by another introduced by Clementi and Co., which was simply an improvement in the damper. The last addition made in the square pianoforte action was the check. The check is certainly a most important part of a pianoforte, and the best of actions is nothing without it. The check is placed behind the hammer nearly at the end of the key, where after the blow has been given it catches the tail of the hammer and holds it till another blow is required.

The square pianoforte, as an instrument, was a poor contrivance compared with the grand or the upright as regards touch, tone, and appearance. Sebastian Erard introduced an action which, with certain



BRINSMEAD WREST PLANK
PAT. No. 5609

FIG. 1.



ORDINARY WREST PLANK

FIG. 2.

modifications, is used in the pianos made by the great firm bearing the name of the illustrious Alsatian mechanic, but there is nothing finer as a piece of delicate pianoforte mechanism than the perfect repeater

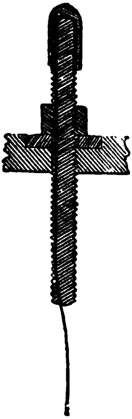


Fig. 3.

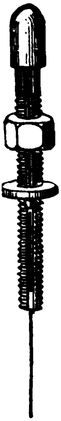


Fig. 4.

check action of Messrs. John Brinsmead and Sons.

The mechanism in the pianos made by this celebrated firm, both in the upright and in the grand, produces in the simplest manner every effect which the pianist could desire. Besides a clear, uninterrupted, and consistent tone, as well as a perfect check and repetition, it secures an extremely light and firm touch, and one that seems to sympathise with the player, so rapidly and unfailingly does it express his ideas. A new piano, patented by John Brinsmead and Sons in 1885, completely revolutionised the system of piano building, the metal frame and bracings being in front of the sounding-board instead of behind, while the wrest plank and bracings are of solid metal instead of wood. In this new arrangement the tuning pins (Fig. 1) are at the

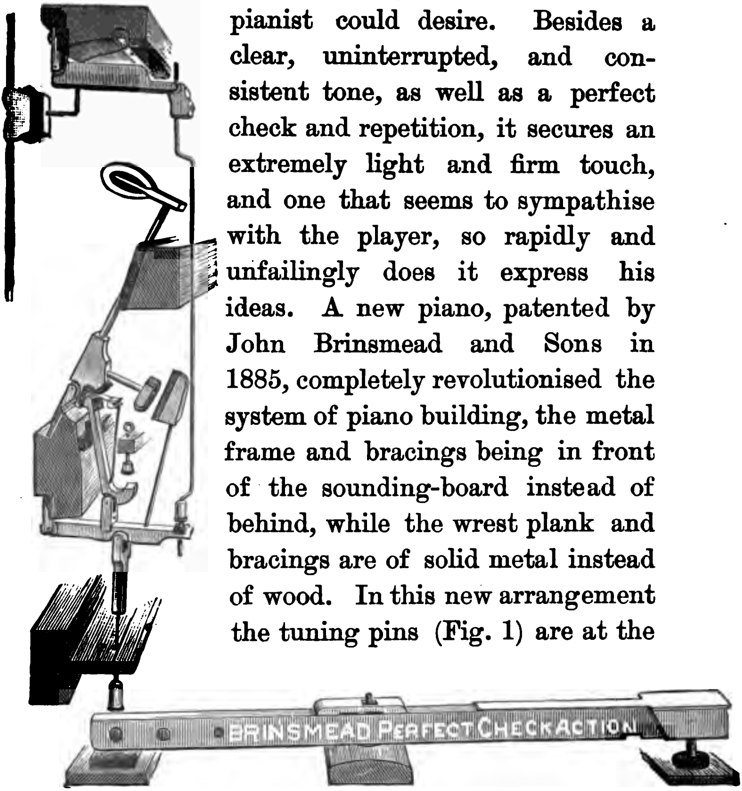


FIG. 5.

top of the wrest plank in a direct line with the strings, instead of at right angles with them, and the tuning is effected by means of a simple nut and screw (Figs. 3 and 4), which can be turned by the thumb and one finger alone—an obvious improvement upon the clumsy old tuning pegs (Fig. 2), which can scarcely be moved by anyone but an experienced tuner. Moreover, the sounding board or resonator is by the new system attached to the piano in precisely the opposite way to that in which it was formerly fixed. The advantages of the Brinsmead system are as follows:

1. The entire frame is continuous throughout, the wrest plank being cast in one piece with the metal supports and string plates. Great solidity and durability are thus ensured.

2. The dangerously numerous gluings in the old wooden frames are entirely superseded by solid metal capable of with-

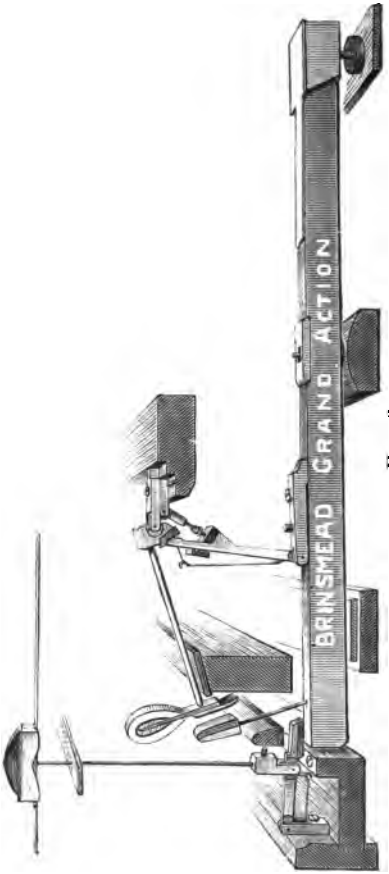


FIG. 6.

standing a strain equal to any that could be withstood by steel.

3. The tuning of the pianoforte is rendered easier, more perfect, and more lasting than was hitherto possible.

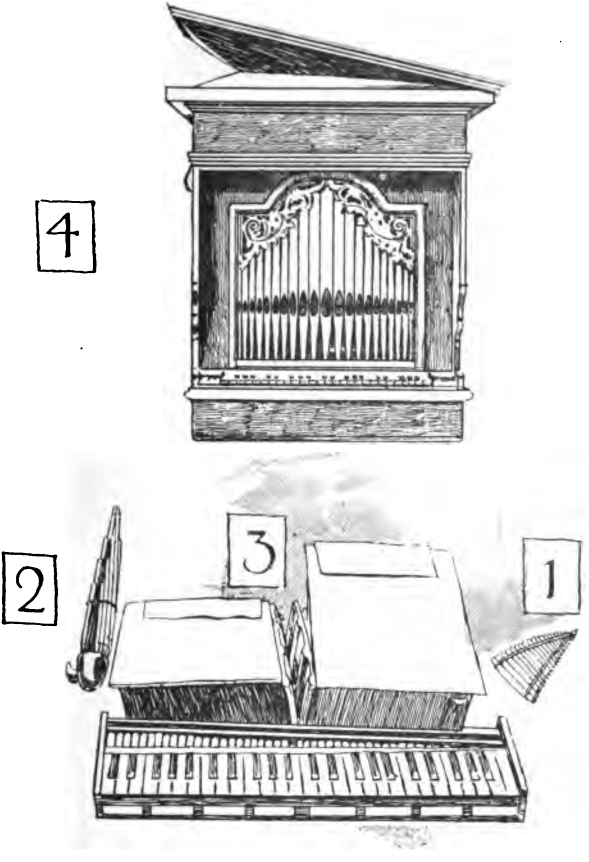
4. Gluing being superseded by metal, the new piano is almost imperishable, with the exception of those few parts which can be renovated at only a slight cost.

5. The tone of a new upright grand is more than equal to that of the largest concert grand constructed on the old system.

6. The perfect check repeater action (Figs. 5 and 6) is the first existing mechanism which combines the lever, the spring, and the wedge: thus providing a leverage for the finger of the performer, theoretically and practically perfect.

The Organ Family.

THE word organ, derived from the Greek *organon,* Latin *organum,* had originally a very extensive meaning, and signified every kind of instrument for whatever purpose employed. By degrees it was confined to instruments of music. Afterwards it was applied only to the pneumatic or wind kind, and finally it was exclusively used to designate that "world of sounds" which we call the Organ. It can hardly be doubted that this noble instrument can be traced to the Pandean pipes or Syrinx (Fig. 1), an instrument so unusually diffused that it would be easier to name the countries in which it is not than those in which it is common. The Syrinx was known to the American Indians before our discovery of the Western



THE ORGAN FAMILY.

Hemisphere. It is probably the Ugab of the Hebrews mentioned in the Old Testament. The mode of playing on the earliest organ must have been troublesome and tiring, as either the mouth had to be in constant motion to and fro over the tubes, or they had incessantly to be shifted to the right or left under the mouth.

The Chinese Mouth Organ (Fig. 2) is a gourd with its top cut off and a flat cover cemented upon it. Twenty-one bamboo pipes are inserted round the cover, but four, being intended for convenience in holding the instrument, do not sound. Those intended to sound are provided with small brass reeds similar to the "free" reeds of the harmonium of which this may fairly be considered the progenitor. By a peculiar arrangement, unique in wind instruments, the Chinese Mouth Organ is sounded by *inhaling* the air, and when a small hole pierced in each pipe is covered by the finger, the column of air descending the whole length of the pipe sets the reed in vibration. It must soon have been discovered that the air may be forced into a closed cavity, and then distributed at will to one or more tubes, and pursuing the contrivance a little further, something like a modern organ was likely to be produced. Mersenne, in his *Harmonie Universelle,* mentions an ancient instrument in the Mattei Gardens in Rome, on which appears the representation of a pneumatic organ. It is a small chest placed upon a table. In the front is a female figure playing on a number of keys, and on the other side is a man blowing into the box with a pair of bellows, exactly like those in present use. St. Augustine, in his comments on the 56th Psalm, alludes to instruments inflated by bellows. In the same passage he also gives us to understand that organ was a generic term including every species. "Organa," he says, "dicuntur omnia instrumenta musicorum," &c. The descriptions left us by the different authors of the musical instruments of the early part of the Middle Ages, and the representations of them on several monuments, prove that attempts were made at several periods to improve them. Much thought was expended in discovering the best method of introducing air into the pipes of their organ. For this purpose a fall of water was employed, and also what must be understood to have been steam. William of Malmesbury describes the manner in which the latter was used. He says: "The wind, being forced out by the violence of the hot water, fills the whole cavity of the instrument, which from several apertures passing through brass pipes sends forth musical noises." At length bellows were employed for the purpose, which were either worked by water or by hand. The application of these two powers led to the distinguishing terms, *hydraulic* and *pneumatic*, or water organ and wind organ, though, in point of fact, the ultimate result was the same in both. The inventor of the former, which historians call a *hydraulicon*, is ascribed to Ctesibius of Alexandria, who lived about B.C. 150 to 120. Vitruvius is the first writer who gives any account of an organ of that kind. The period the organ was introduced into the churches of Western Europe is very uncertain. Pope Vitalian is supposed to have been the first to admit the instrument, about the year 670; but the earliest account, to be at all relied on, of the introduction of this instrument in the West is, that about the year 755 the Greek Emperor, Copronymus, sent one as a present to Pepin, King of France. In the time of Charlemagne, however, organs became common in Europe. That prince had one built at Aix-la-Chappelle in 812, on a Greek model which the learned Benedictine, Bedos de Celles, in his work, "L'Art du Facteur des Orgues," 1766, considers to have been the first that was furnished with bellows without the use of water. Hopkins, the greatest authority on the organ, says:—"Great as may have been the theoretical merits of the hydraulic system, yet in practice it does not seem to have supplanted the purely pneumatic. The hydraulic organ, nevertheless, continued in occasional use up to about the commencement of the fourteenth century, when it appears finally to have died out. Its weight and size seem to have originated a distinction between portable and stationary organs, which began early and was perpetuated in the terms frequently used of 'Portative' and 'Positive.'"

The invention of balanced lever keys was earliest applied to the organ. The first glimmering of light is, according to Hopkins, in the thirteenth century. An organ illustrated on an altar-piece in a Spanish monastery, dated 1390, has three rows of pipes, and balanced white natural keys, with one additional key let in. The Halberdstadt organ was built in A.D. 1361, and renovated A.D. 1495. The keys were very wide: on the two upper keyboards, four inches from centre to centre of each key with chromatic keys two inches wide, placed two and a-half inches above the diatonic. There could be with this keyboard no question of stretching an octave with the extended hand, or even more than a major third, and what we call fingering was entirely out of the question. The organist used the side of his clenched fist to depress the keys. A keyboard similar to the one now in use was not made before A.D. 1499. The complete organ was made about A.D. 1530, when the reed stop was invented. The Regal of the sixteenth and seventeenth centuries, was a complete reed stop, taken from the organ and used as a separate instrument for accompaniments in convents and elsewhere (Engel). The case of this little organ was sometimes made in the shape of a book, and was called the Bible Regal (Fig. 3). It is opened in the middle like a book. The interior contains at each side the keyboard, which must be taken out of the cover and correctly adjusted. Under the keyboard are the windchest and the pipes, which are true organ pipes with "beating" reeds, but very small. By reversing the book-cover and attaching it to the back of the instrument the bellows are obtained. There was till the end of the last century a tuner of regals in the Chapel Royal of St. James's, with a salary of £56 per annum. The regal is frequently mentioned in English literature of the time of Shakespeare and earlier. The curious name is supposed to have been derived from rigabello, a musical instrument of which scarcely more is known than it was played in the churches of Italy before the introduction of the organ. Fig. 4 is a portable organ of the early seventeenth century. It could be carried from place to place by bearing poles placed through rings on each side, but was put on a table when played, hence its name "Positive," as distinct from the

"Portative," a much smaller organ, which could be carried and played simultaneously by one performer. The specimen in the Galpin Collection is blown by means of a strap on the left side, and curiously enough the bellows are *above* the pipes, as in a similar organ figured by Mersenne (1627). Indications, however, remain of its having been at one time blown by a pair of bellows at the back like the regal. There are four stops, drawn out on the right side, and consisting of a stopt Diapason, Principal, Twelfth, and Fifteenth. This interesting little organ has a compass of four octaves from the c on the bass stave, and was probably made in Germany.

The modern organ is too well known to need a detailed description in this little book, but I think that a brief reference to the finest toned organ I have ever heard may be interesting to some of my readers. I have to lecture on scientific subjects at many of our public schools and colleges and I have special opportunities of hearing the organs in the school chapels.

For quality of tone I have not heard any instrument to surpass the noble organ at Radley College. Through the kindness of the Precentor the Rev. G. Wharton, M.A., I am able to give a brief account of that instrument.

The instrument, originally consisting of three manuals, was built by Messrs. Telford and Telford, of Dublin, in the year 1846, and was borrowed for use in the Dublin Exhibition of 1852; and, having undergone many alterations since that time, it has been found necessary to entirely reconstruct the instrument. In order to bring it thoroughly up to date, new mechanism of the latest type has been applied. This grand organ now consists of five complete manuals and a pedal organ, with the draw-stop jambs at an angle of 45 degrees, fitted with handsome ivory draw-stop knobs. The compass of the respective organs is as follows :—The five manuals, cc to g, 56 notes; pedal organ, ccc to g, 32.

Pneumatic lever action has been applied to the great organ, acting on all the manual couplers. The key action to the solo organ is on a new principle, and is considered a great feature of the organ. Operating on a five-inch pressure, it is as light as, and has a repetition equal to, the best modern pianoforte. It has tubular pneumatic to echo and pedal organs on a three-inch pressure, tubular pneumatic replacing conveyances throughout the instrument. Tubular pneumatic combination draw-stop action, specially invented for this organ, by which it is possible to obtain numerous changes in registering the stops. It consists of four composition pedals and four interchangeable pneumatic pistons to the great organ. This also acts on the pedal organ, and gives a proportionate bass to any combination on the great organ. There are also four fixed combination pedals and four interchangeable pneumatic pistons to the swell organ.

The organ is blown by one of Crossley's "Otto" gas engines, operating on nine large feeders, supplying wind to five large reservoirs of various pressures.

Four pneumatic pistons are applied both to the great and swell organs, by which any combinations of stops can be arranged to suit the convenience of the performer.

This magnificent organ has 71 stops, the *Vox humana* surpassing anything I have ever heard.

W. Speaight & Sons, Printers, Fetter Lane, London.

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